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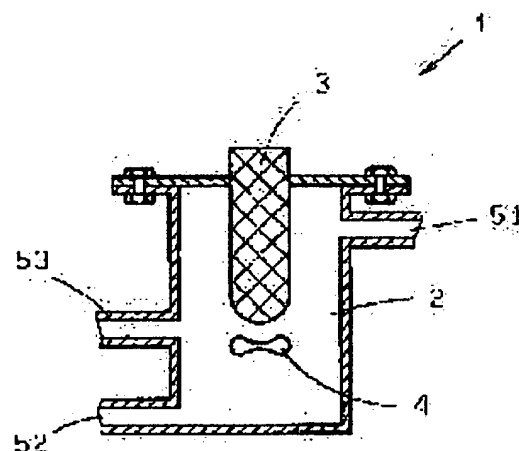
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## (54) ORGANIC WASTE WATER TREATING METHOD

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an organic waste water treating method having a function capable of supplying the sludge, etc., as it is after being treated to the next stage biological treating system without post treatment and also having the function as a pretreating method of the organic waste water by supplying the organic waste water other than organic sludge by modifying in a state easily biotreatment in a method for modifying the waste water of organic sludge, etc., to readily biodegradable by ultrasonic treatment.

**SOLUTION:** In the waste water treating method in which an oxidation promoter for promoting the oxidation of an organic material in the waste water is mixed in the organic waste water, the ultrasonic treatment is performed just before, during or just after the stage in which the organic waste water and the oxidation promoter are mixed, moreover the oxidation promoter is hydrogen peroxide solution.



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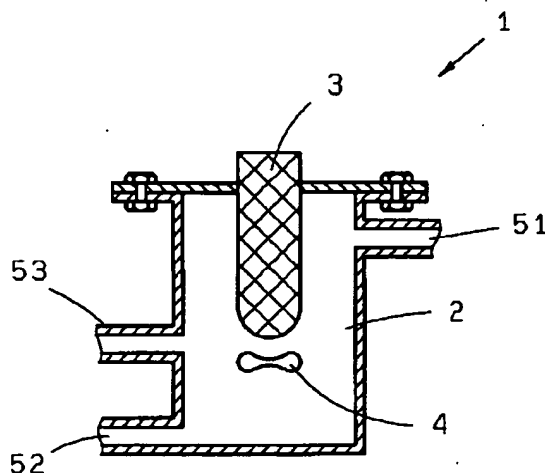
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(54)【発明の名称】 有機性廃水の処理方法

(57)【要約】

【課題】 超音波処理で有機性汚泥等廃水を易生物分解性に変性する方法において、処理後の汚泥等を後処理なしにそのまま次工程の生物処理システムに供給可能とし、かつ、有機性汚泥以外にも有機性廃水を生物処理が容易な状態に変性して生物処理システムに供給し、生物処理を容易にするための有機性廃水の前処理方法としての機能も有する有機性廃水の処理方法を提供する。

【解決手段】 有機性廃水に該廃水中の有機性物質の酸化を促進させる酸化促進剤を混合してなる廃水処理方法であって、前記有機性廃水と酸化促進剤とを混合する工程の直前、工程中又は工程の直後に超音波処理を行い、更に酸化促進剤が過酸化水素水であることを特徴とする有機性廃水の処理方法である。



## 【特許請求の範囲】

【請求項1】 有機性廃水に該廃水中の有機性物質の酸化を促進させる酸化促進剤を混合してなる廃水処理方法であって、前記有機性廃水と酸化促進剤とを混合する工程の直前、工程中又は工程の直後に超音波処理を行うことを特徴とする有機性廃水の処理方法。

【請求項2】 請求項1記載の酸化促進剤が、過酸化水素水であることを特徴とする有機性廃水の処理方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、下水、尿尿廃水、又は各種有機性産業廃水等や、これらの廃水が生物処理方法で処理された際に発生した余剰汚泥を、易生物分解性とするための、有機性廃水や余剰汚泥の前処理方法に関するものである。

## 【0002】

【従来の技術】廃水の生物処理により定常的に発生する余剰汚泥は、脱水処理、焼却処理され、最終的には埋め立てにより処分されている。しかしながら、焼却処理においては、焼却場からのダイオキシン発生や悪臭などの社会問題が起こりやすく、埋め立て処分では埋め立て地の枯渇や地下水汚染等の問題が散見されているため、余剰汚泥そのものの減量化やメタン発酵処理、コンポスト化処理等への有効利用処理が検討されている。

【0003】余剰汚泥そのものの減量化に関しては、一旦、発生した余剰汚泥を生物処理システム外に取り出し、オゾン処理、機械的破砕処理、加熱加圧処理、高温好気性生物処理等を施し、余剰汚泥を易生物分解性に变性させた後、元の生物処理システムに戻して処理し、その生物処理システムとしては余剰汚泥の排出を無くするという試みがなされている。

【0004】特開昭平2-280900号公報には、有機性汚泥にガラスビーズ等の無機微粒子を混入して連続的に超音波を投射し、汚泥を易生物分解性に变性させる方法が開示されている。この方法は超音波によって有機汚泥特に生物性汚泥の細胞壁を破壊する際に、破壊効果を高める目的で混入されるものである。しかしながらこの方法では、無機微粒子の衝突による超音波振動子や処理槽の容器壁の損傷が懸念され、長期運転のためには超音波振動子及び容器に多大な強度が必要となり、しかも、処理後の有機性汚泥からの無機微粒子の分離性を良くするために、廃水中の有機性固形物をより細かく粉砕若しくは分解する必要がある、処理時間が長くなるという問題点があった。また、無機微粒子分離除去用の濾過装置のメンテナンスに手間が掛かる等の問題点があった。

## 【0005】

【発明が解決しようとする課題】本発明の目的は、超音波処理方法で有機性汚泥等廃水を易生物分解性に变性する際に、超音波振動子及び容器の損傷を減少し、かつ、

処理後の汚泥等を後処理なしにそのまま次工程の生物処理システムに供給可能とする、汚泥等の廃水処理装置を提供するものである。

## 【0006】

【課題を解決するための手段】本課題を解決するための本発明の請求項1記載の廃水の処理方法（発明1）は、有機性廃水に該廃水中の有機性物質の酸化を促進させる酸化促進剤を混合してなる廃水処理方法であって、前記有機性廃水と酸化促進剤とを混合する工程の直前、工程中又は工程の直後に超音波処理を行うことを特徴とする有機性廃水の処理方法である。

【0007】本発明の請求項2記載の廃水の処理方法（発明2）は、発明1の酸化促進剤が、過酸化水素水であることを特徴とする有機性廃水の処理方法である。

【0008】本発明は、有機性廃水中の有機性物質の易生物分解性処理を、超音波による物理的な破壊効果と廃水中の有機性物質の酸化を促進する酸化促進剤（以降、酸化促進剤という）による化学的な酸化効果との相乗効果により、処理効果を高めるものである。即ち、有機性排水中の難生物分解性物質や生物性余剰汚泥等の細胞壁は超音波による物理的な損傷に加え、酸化促進剤により、難生物分解性物質や細胞壁を構成する高分子物質が化学的に酸化されて低分子量化され、生物分解性が良くなる。

【0009】本発明が対象とする廃水は、生物処理が可能な有機性廃水である。即ち、下水尿尿廃水；台所廃水、ディスポーザー廃水等の家庭廃水；食堂廃水、焼酎製造廃水、醤油製造廃水、豆腐製造廃水、食肉加工廃水、魚介類加工廃水等の産業廃水や食品加工廃水等の廃水であり、更に各種生物処理システムから発生する余剰汚泥（生物性固形物を大量に含む廃水）等を含むものである。本発明は、これら廃水に対しては、生物処理する前に生物処理を促進させるための予備分解処理方法として適用され、各種生物処理後の余剰汚泥に対しては、汚泥の減量化のための元システム戻しての再生物処理を容易にするための汚泥処理方法として機能する。

【0010】酸化促進剤としては、細胞壁組織に作用してその構成物質を分解可能なものであって、一般的に有機性物質の酸化力が強い若しくは酸化促進効果を有する元素若しくは化合物等が用いられる。有機性物質の酸化力の強い元素若しくは化合物としては、例えば一例として、過酸化水素、オゾン等の活性酸素発生剤類；各種過酸化物質類；次亜塩素酸ナトリウム等ハロゲン類；過マンガン酸化合物、クロム酸化合物類等；硝酸、硫酸等無機酸類が挙げられ、酸化促進効果を有する化合物としては、例えば、ヒドロキシラジカルの発生促進触媒として作用する酸化チタン等の化合物が挙げられる。

【0011】但し、処理後の廃水中に残存して排出される可能性が高いMn、Cr等の重金属類の化合物が用いられる場合には、更に後処理を行って確実にMnやCr

等の重金属が排出されないようにしたり、無機酸類等が用いられる場合では、pH調節を行ったりしなければならなくなる必要があるため、一般的には使用しづらい面があるが、後処理として重金属除去や中和を確実に行えば適用できないということではない。従って、後処理が不要となる少なくとも酸素、活性酸素、酸素ラジカル、活性酸素ラジカル、ヒドロキシラジカル等のいずれかを発生する元素若しくは化合物を用いることが好ましく、例えば、実用的には、過酸化水素、過酸化水素水、オゾン等が用いられることが多いが、取り扱い性や保安上の容易さから、過酸化水素水が用いられることが最も好ましい。

【0012】使用される酸化促進剤の量は、それぞれの酸化促進剤の酸化力及び被処理廃水中の有機物質質量によって適宜適当な量が選択されて使用される。又、酸化処理に必要な量よりも過剰に添加される場合には、処理後の処理水が次工程での生物処理されるのに影響されないよう、還元剤、中和剤、脱オゾン剤等を用いて、処理水に残存する酸化促進剤を除去しても良い。

【0013】本発明では、上記有機性廃水に酸化促進剤を混合し、混合直前、混合中又は混合直後に超音波処理を行う。上記処理に用いられる超音波振動子は一般的に用いられているものでよく、その周波数は、一般的な超音波処理に用いられている周波数と同じく通常10kHzから2MHzのものが適用可能である。また超音波振動子の表面材質についても特に制限されるものではなく、一般に用いられているものを適用することができる。

【0014】本発明の方法を適用するための処理装置は、超音波振動子により発生する超音波エネルギーにより損傷を受けず、又そのエネルギーが外部に漏れない構造とされ、必要とされる耐久性が保持されていなければならない。そのために、容器材質としては、例えば、鋼、ステンレススチール、内面ガラスライニング鋼、チタン等が用いられ、又、超音波振動子は容器中央に配置される例が多い。

【0015】本発明の処理方法を行うための処理装置は、上記材質の容器に、上記超音波振動子が備えられた超音波処理部、廃水の流入口、流出口及び酸化促進剤の投入口を備えたものであり、更に、必要によって酸化促進剤の混合を確実にするための攪拌機が備えられていても良い。但し、攪拌機が設けられる場合には、気泡の巻き込みが少なくなるようにし、かつ超音波や酸化促進剤による腐食や損傷が少なくなるように配慮する事は当然である。

【0016】容器内の廃水の流れ方向は特に制限されることはない。廃水の流入口及び流出口はどこに設けられていても良いが、酸化促進剤と廃水とが混合され、かつ超音波処理と酸化促進剤との相乗効果による廃水の易生物分解性化のために要する時間だけ、被処理排水は処理

装置の超音波処理部に滞留しなければならない。通常は、酸化促進剤投入口以降の超音波処理部の容積は、滞留時間0.5分～15分となるように設定される。この時間内であれば、超音波処理が確実に入る、しかも超音波処理が過剰な時間とはならない。

【0017】酸化促進剤の酸化効果を充分に発揮させるために、本発明においては、超音波処理を行う時間と酸化促進剤を排水中に混入する時間とのタイミングが制御される。即ち、超音波処理工程に対してあまりに酸化促進剤の添加時間が早いと、超音波処理が行われるより以前に酸化促進剤が分解して廃水中の残存量が減少して酸化促進剤と超音波処理の相乗効果が弱くなり、逆にあまりに遅ければ、超音波処理と酸化処理とが別々に行われたと同様となって相乗効果が薄れ、やはり効果が弱くなる。

【0018】本発明の廃水処理方法は、酸化促進剤と超音波との相乗作用で易生物分解性化処理が行われるので、超音波処理部においては、廃水と必要な量の酸化促進剤とが混合されていることが必要であるが、酸化促進剤により超音波振動子の表面が多少酸化されて劣化が早くなる可能性がある。従って、酸化促進剤の添加位置は超音波振動子の配置位置より下流側に配置され、なるべく超音波振動子に直接接触する機会を減らすようにされることが望ましい。この場合でも、超音波は超音波処理部全体に届いているので、処理効果は充分に発現する。勿論、設備配置や作業性の都合で酸化促進剤投入口が超音波振動子の上流側とされていても構わない。

【0019】酸化促進剤の排水中への投入方法は、酸化促進剤投入後速やかに酸化促進剤と被処理廃水とが混合される方法であれば特に制限されないが、空気を巻き込むと超音波の処理効率が低下するので、なるべく空気を巻き込まない方式のものが好ましい。なお、酸化促進剤があまりに短時間で分解してしまわないような過酸化水素水等などの物質である場合には、例えば、廃水流入口に酸化促進剤のミキシングヘッド（インジェクタで一、エゼクター、ディフューザー等）を用いて、廃水と酸化促進剤とを混合後速やかに超音波処理部に流入させる方法でも良く、また、酸化促進剤の添加位置を超音波振動子の下流側とする場合には、一般的な薬剤添加方法で行われればよい。

【0020】また、本処理方法により処理された廃水又は汚泥は、活性汚泥法、回転円板法、接触曝気法、等の好気性生物処理法及び、好気/嫌気処理に利用可能である。また、嫌気処理については、メタン発酵、アルコール発酵、酸発酵等の、有機物からメタン等のガス；エタノール、ブタノール等の各種アルコール；酢酸、乳酸、酪酸等の各種有機酸の回収などにも適用が可能である。

【0021】（作用）このように、本発明の廃水の処理方法では、超音波による物理的效果と酸化促進剤による化学的效果との相乗効果により、効率よく有機性廃水や

生物性汚泥等の易生物分解性処理を行うことが可能となるのである。

#### 【0022】

【発明の実施の形態】次に、図面を参照しながら本発明の実施の形態を詳しく説明する。図1は、本発明の廃水の処理方法で廃水処理を行うための処理装置の実施の一例の正面断面説明図である。

【0023】説明用に例示された図1においては、廃水の処理装置1は超音波振動子3を備えたステンレス製円筒状超音波処理部2に、廃水流入口51とに廃水の流出口52及び超音波振動子の下流側近傍に酸化促進剤投入口53が設けられている。酸化促進剤投入口53の近傍には攪拌機4が備えられ、空気の巻き込みが無いようにして添加された酸化促進剤と廃水とが速やかに混合されるようにされている。流入口51及び流出口52は図示された位置に限ったものではなく、超音波処理部2に流入された廃水がショートカットして流出し得る場合、かつ、廃水の超音波処理部2内での滞留時間が確保される位置に配置されていれば良い。

【0024】また、酸化促進剤は超音波処理時に酸化促進剤が消費されてしまっている酸化促進剤の添加効果が少なくなるので、流入される被処理廃水に予め混合されて導入されるのではなく、本例におけるように、超音波処理部2に設けられた酸化促進剤投入口53から投入される。この場合、酸化促進剤投入口53の配置場所は、超音波処理部2であればどこでもよく、図1で例示した超音波振動子3の下流側近傍のみならず、上流側近傍でも良い。

【0025】また、超音波処理部2の形状は円筒形に限らず、超音波処理部2内の廃水がスムーズに流通可能であって、超音波処理された廃水がほぼ処理された順に流出可能であればどのような形状であっても良い。例えば、超音波処理部2が円筒形状であって廃水流入口51及び流出口52の軸が円筒の断面接線方向に沿うように設けられ、流入した廃水が円筒の円周に沿って螺旋状に流れ、スムーズに流出できるようにされていると、装置1全体の容積を小さくでき好都合である。

【0026】（実施例1）全容量50mLの円筒状超音波処理部2の中央部に周波数20kHzの超音波振動子3が設けられ、廃水流入口51の配置位置が上方、流出口52の位置が下方、酸化促進剤投入口53の位置が超音波振動子3の直後であって酸化促進剤投入口53以降の容積が20mL、酸化促進剤投入口の近傍に攪拌機4を設けた円筒状ステンレス製廃水処理装置1を用いた（図1参照）。

【0027】この処理装置を用いて、MLSS1600

0mg/L、BOD2100mg/Lの汚泥を、流入速度を変更することで酸化促進剤投入口53以降の滞留時間を、1分、3分、5分、10分と変化させるよう導入した。同時に1%過酸化水素水を、汚泥流量10mL/分当たり1mL/分で投入し超音波処理を行った。滞留時間1条件当たり1週間の運転を行い、この間毎日1回の原水と処理水とのBOD値を測定し、それぞれの平均値を求めた。

【0028】（実施例2）実施例1と同じ処理装置1を用い、汚泥の流入と流出とを実施例と逆にし、その結果、酸化促進剤投入口53以降の容積が30mL、酸化促進剤投入口53の位置が超音波振動子3の直前と見なされるようにして、実施例1と同様に滞留時間を種々に変化させて1週間の超音波処理を行い、この間毎日1回の原水と処理水とのBOD値を測定し、それぞれの平均値を求めた。

【0029】（比較例1）実施例1と同じ装置を用い、過酸化水素水を添加しなかった以外は実施例1と同じとして超音波処理を行った。

【0030】（比較例2）実施例2と同じ装置を用い、過酸化水素水を添加しなかった以外は実施例2と同じとして超音波処理を行った。

【0031】実施例1、2及び比較例1、2の結果を図2に示す。過酸化水素水を用いた実施例1及び実施例2の場合には、いずれも場合も処理後の廃水のBODが上昇し、過酸化水素水を用いなかった比較例1及び比較例2と較べて、生物処理性が向上していることが分かる。

#### 【0032】

【発明の効果】以上の通りであるので、本発明の廃水の処理方法は、超音波による物理的効果と酸化促進剤による化学的効果との相乗効果により、効率よく有機性廃水や生物性汚泥等の易生物分解性化が行われ、余剰汚泥の減容化若しくは有機性廃水の前処理方法として有効なものとなるのである。

#### 【図面の簡単な説明】

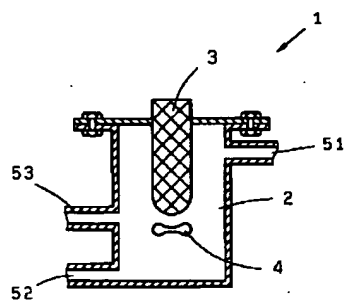
【図1】本発明の廃水の処理装置の正面断面説明図。

【図2】図1の装置を用いた時の原水と処理水のBOD変化図。

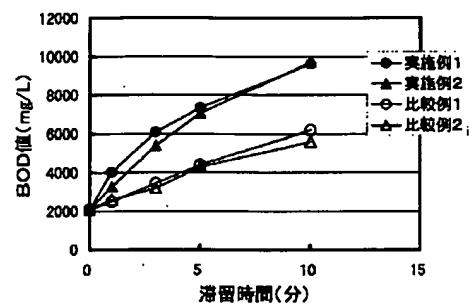
#### 【符号の説明】

- 1 処理装置
- 2 超音波処理部
- 3 超音波振動子
- 4 攪拌機
- 51 廃水流入口
- 52 廃水流出口
- 53 酸化促進剤投入口

【図1】



【図2】



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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention relates to the pretreatment approach of the organic waste water for making into easy biodegradability the excess sludge generated when sewage, excrement waste water or various organic the-sex-industry waste water, and such waste water were processed by the biological treatment approach, or excess sludge.

**[0002]**

**[Description of the Prior Art]** The excess sludge regularly generated by the biological treatment of waste water is dehydration-processed, and incineration processing is carried out and, finally it is disposed of by reclamation. However, in incineration processing, social problems, such as dioxin generating from the space destroying by fire and an offensive odor, tend to arise, and since problems, such as an exhaustion of a reclaimed ground and groundwater contamination, have appeared here and there, the deployment processing to streamlining of excess sludge itself, methane fermentation processing, composting processing, etc. is considered by reclamation disposal.

**[0003]** After once taking out the generated excess sludge out of a biological treatment system about streamlining of excess sludge itself, performing ozonization, mechanical crushing processing, heating pressure treatment, elevated-temperature aerobic organism processing, etc. and denaturing excess sludge to easy biodegradability, it returns and processes to the original biological treatment system, and the attempt in which discharge of excess sludge is abolished as the biological treatment system is made.

**[0004]** Non-subtlety particles, such as a glass bead, are mixed in organic sludge, a supersonic wave is continuously projected on the Provisional-Publication-No. Taira No. 280900 [ two to ] official report, and the method of denaturing sludge to easy biodegradability is indicated. In case this approach destroys the cell wall of organic sludge, especially living thing nature sludge with a supersonic wave, it is mixed in order to heighten the destructive effectiveness. However, by this approach, we were anxious about damage on the vessel wall of the ultrasonic vibrator by the collision of a non-subtlety particle, or a processing tub, in order to be long-term operation, great reinforcement was needed for the ultrasonic vibrator and the container, and in order to improve separability of the non-subtlety particle from the organic sludge after processing, the organic nature solid in waste water needed to be ground or disassembled more finely, and moreover, there was a trouble that the processing time became long. Moreover, there were troubles, like the maintenance of the filter for non-subtlety particle separation removal takes time and effort.

**[0005]**

**[Problem(s) to be Solved by the Invention]** In case the purpose of this invention denaturalizes waste water, such as organic sludge, to easy biodegradability by the sonication approach, it offers waste water treatment equipment which decreases in number damage on an ultrasonic vibrator and a container, and enables supply of the sludge after processing etc. have [ no after treatment ] as it is at the biological treatment system of degree process, such as sludge.

**[0006]**

**[Means for Solving the Problem]** The art (invention 1) of the waste water of this invention for solving this technical problem according to claim 1 is the waste-water-treatment approach which comes to mix the pro oxidant which makes organic waste water promote oxidation of the organic nature matter in this waste water, and is just before the process which mixes said organic waste water and pro oxidant in process or an art of organic waste water characterized by ultrasonically immediately after a process.

**[0007]** The art (invention 2) of the waste water of this invention according to claim 2 is an art of the organic waste water

with which the pro oxidant of invention 1 is characterized by being hydrogen peroxide solution.

[0008] This invention heightens a treatment effect according to the synergistic effect of the physical destructive effectiveness according easy biodegradable processing of the organic nature matter in organic waste water to a supersonic wave, and the chemical oxidation effectiveness by the pro oxidant (it is henceforth called a pro oxidant) which promotes oxidation of the organic nature matter in waste water. That is, in addition to the physical damage by the supersonic wave, the high polymer which constitutes the difficulty biodegradability matter and a cell wall oxidizes chemically by the pro oxidant, the cell wall of the difficulty biodegradability matter in organic waste water, living thing nature excess sludge, etc. is low-molecular-weight-ized, and biodegradability becomes good.

[0009] The target waste water [ this invention ] is organic waste water in which biological treatment is possible. Namely, swage effluents, such as sewage excrement waste water; kitchen waste water and disposer waste water; it is waste water [ , such as industrial waste water and food-processing waste water, ], such as dining-room waste water, white-distilled-liquor manufacture waste water, soy sauce manufacture waste water, tofu manufacture waste water, meat-processing waste water, and fish-and-shellfishes processing waste water, and the excess sludge (waste water which contains a living thing nature solid in large quantities) further generated from various biological treatment systems is included. To these waste water, before carrying out biological treatment of this invention, it is applied as a preliminary decomposition art for promoting biological treatment, and functions to the excess sludge after [ various ] biological treatment as the sludge-disposal approach for making easy playback object processing of former system \*\*\*\*\* for streamlining of sludge.

[0010] As a pro oxidant, it acts on a cell wall organization, and or decomposition of the constituent is possible and the oxidizing power of the organic nature matter is generally strong, an element or a compound etc. which has an oxidation facilitatory effect is used. as the strong element or compound of oxidizing power of the organic nature matter -- as an example -- active oxygen generating agents, such as a hydrogen peroxide and ozone, -- inorganic acids [ , such as; nitric acid and a sulfuric acid, ], such as a halogens [ , such as kind; various peroxides; sodium hypochlorites, ]; permanganic acid compound and chromic-acid compounds, are mentioned, and compounds, such as titanium oxide which acts as a generating accelerator catalyst of a hydroxy radical, are mentioned as a compound which has an oxidization facilitatory effect, for example.

[0011] however, when the compound of heavy metal, such as Mn with high possibility of being remained and discharged in the waste water after processing, and Cr, is used Furthermore, although there is a field which is generally hard to use it since after treatment is performed, and heavy metal, such as Mn and Cr, must be made not to be discharged certainly or it must stop having to perform pH accommodation in a using [ inorganic acids ] case It is not inapplicable if heavy-metal removal and neutralization are ensured as after treatment. Therefore, it is desirable to use the element or compound with which after treatment becomes unnecessary and which generates oxygen, active oxygen, an oxygen radical, an active oxygen radical, or a hydroxy radical at least, for example, practical, although a hydrogen peroxide, hydrogen peroxide solution, ozone, etc. are used in many cases, it is most desirable that hydrogen peroxide solution is used from handling nature or the ease on security.

[0012] The amount of the pro oxidant used is suitably used for a suitable amount by the organic nature amount of substance in the oxidizing power of each pro oxidant, and processed waste water, being chosen. Moreover, when added more superfluously than a complement by oxidation treatment, the pro oxidant which remains in treated water may be removed using a reducing agent, a neutralizer, a deozonization agent, etc. so that the treated water after processing may not be influenced, although [ in degree process ] biological treatment is carried out.

[0013] In this invention, a pro oxidant is mixed to the above-mentioned organic waste water, and it ultrasonicates just before mixing, during mixing, or immediately after mixing. Generally the ultrasonic vibrator used for the above-mentioned processing is used, and can usually apply a 2MHz thing from 10kHz as well as the frequency which is easy to be used for sonication with the common frequency. Moreover, it is not restricted especially about the quality of facing of an ultrasonic vibrator, either, and what is generally used can be applied.

[0014] It must consider as the structure where the processor for applying the approach of this invention does not receive damage with the ultrasonic energy generated with an ultrasonic vibrator, and the energy does not leak outside, and the endurance needed must be held. Therefore, as the container quality of the material, for example, steel, stainless steel, inside glassed steel, titanium, etc. are used, and an ultrasonic vibrator has many examples arranged in the center of a container.

[0015] The processor for performing the art of this invention is equipped with the sonication section and the input of waste water where the container of the above-mentioned quality of the material was equipped with the above-mentioned ultrasonic vibrator, a tap hole, and the input port of a pro oxidant, and you may have the agitator for ensuring mixing of a



pro oxidant as occasion demands further. However, when an agitator is formed, naturally it considers so that it may be made for the contamination of air bubbles to decrease and the corrosion and damage by the supersonic wave or the pro oxidant may decrease.

[0016] Especially the flow direction of the waste water in a container is not restricted. Although the input and the tap hole of waste water may be prepared anywhere, as for treated waste water, only the time amount which a pro oxidant and waste water are mixed and is required for easy-biodegradability-izing of the waste water by the synergistic effect of sonication and a pro oxidant must pile up in the sonication section of a processor. Usually, the volume of the sonication section after pro oxidant input port is set up as it has been 0.5 minutes - residence-time 15 minutes. If it is in this time amount, sonication can be ensured and, moreover, sonication will not serve as superfluous time amount.

[0017] In order to fully demonstrate the oxidation effectiveness of a pro oxidant, in this invention, timing with the time amount mixed while draining the time amount and the pro oxidant which ultrasonicate is controlled. That is, to a sonication process, a pro oxidant will decompose before rather than sonication will be performed, if the addition time amount of a pro oxidant is too early, the amount of survival in waste water will decrease, the synergistic effect of a pro oxidant and sonication will become weak, if too conversely late, it becomes the same, and the synergistic effect will fade and effectiveness will become it weak that sonication and oxidation treatment were performed separately too.

[0018] Although the waste-water-treatment approach of this invention needs to mix waste water and the pro oxidant of a complement in the sonication section since easy biodegradability-ized processing is performed by the synergism of a pro oxidant and a supersonic wave, the front face of an ultrasonic vibrator may oxidize somewhat by the pro oxidant, and degradation may become early. Therefore, as for the addition location of a pro oxidant, it is more desirable than the arrangement location of an ultrasonic vibrator to reduce an opportunity to arrange at the downstream and contact an ultrasonic vibrator directly if possible. Even in this case, since the supersonic wave has reached the whole sonication section, a treatment effect is fully discovered. Of course, pro oxidant input port may be made into the upstream of an ultrasonic vibrator on account of facility arrangement or workability.

[0019] Especially if it is the approach with which a pro oxidant and processed waste water are promptly mixed after a pro oxidant injection, it will not be restricted, but since the processing effectiveness of a supersonic wave will fall if air is involved in, the injection approach into wastewater of a pro oxidant has the desirable thing of the method which does not involve in air if possible. In addition, what is necessary is to use the mixing head (for them to be -, an ejector, a diffuser, etc. with an injector) of a pro oxidant for example, for waste water input, in being matter, such as \*\*\*\*\* which a pro oxidant does not decompose too much for a short time, for the approach of making it flow into the sonication section promptly after mixing waste water and a pro oxidant to be used, and to just be carry out by the general drugs addition approach, when making the addition location of a pro oxidant into the downstream of an ultrasonic vibrator.

[0020] Moreover, the waste water or sludge processed by this art is available to aerobic organism approaches, such as an activated sludge process, a rotary disc method, and contact aeration process, and aerobic / aversion processing. Moreover, about aversion processing, it is applicable to recovery of various organic acids, such as various, alcoholic; acetic acids, such as gas; ethanol, such as methane, and a butanol, a lactic acid, and butanoic acid, etc. from the organic substance, such as methane fermentation, alcoholic fermentation, and souring.

[0021] (Operation) By the art of the waste water of this invention, the synergistic effect of the physical effectiveness by the supersonic wave and the chemical effectiveness by the pro oxidant enables it to perform easy biodegradable processing of organic waste water, living thing nature sludge, etc. efficiently in this way.

[0022]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained in detail, referring to a drawing. Drawing 1 is the transverse-plane cross-section explanatory view of an example of operation of the processor for performing waste water treatment by the art of the waste water of this invention.

[0023] In drawing 1 illustrated for explanation, pro oxidant input port 53 is established in the waste water input 51 the tap hole 52 of waste water, and near the downstream of an ultrasonic vibrator at the cylindrical sonication section 2 made from stainless steel which the processor 1 of waste water equipped with the ultrasonic vibrator 3. Near the pro oxidant input port 53, it has an agitator 4, and as there is no contamination of air, he is trying to be promptly mixed in the pro oxidant and waste water which were added. Input 51 and a tap hole 52 are not what was restricted to the illustrated location, and should just be arranged in the location where the waste water which flowed into the sonication section 2 carries out shortcut, and the residence time within outflow striped \*\*\*\*\* and the sonication section 2 of waste water is secured.

[0024] Moreover, since the addition effectiveness of a pro oxidant of a pro oxidant decreases if the pro oxidant will be

consumed at the time of sonication, the flowing processed waste water is mixed beforehand, and it is not introduced into it, but is supplied from the pro oxidant input port [ as / in this example ] 53 established in the sonication section 2. In this case, \*\*\*\*\* [ a location / as long as the arrangement location of pro oxidant input port 53 is the sonication section 2, it may be good anywhere and ] not only near the downstream of the ultrasonic vibrator 3 illustrated by drawing 1 , but near the upstream.

[0025] Moreover, as long as an outflow in the order by which the waste water by which not only a cylindrical shape but the waste water in the sonication section 2 was able to be circulated smoothly, and was ultrasonicated was processed mostly is possible for the configuration of the sonication section 2, it may be what kind of configuration. For example, it makes small the volume of the equipment 1 whole and is convenient if the sonication section 2 is a cylindrical shape-like, the waste water which prepared and flowed flows spirally in accordance with a cylindrical periphery so that there may be a shaft of the waste water input 51 and a tap hole 52 along a cylindrical cross-section tangential direction, and it enables it to flow out smoothly.

[0026] (Example 1) The ultrasonic vibrator 3 with a frequency of 20kHz was formed in the center section of the cylindrical sonication section 2 of full capacity 50mL, and the arrangement location of the waste water input 51 used the waste water treatment equipment 1 made from cylindrical stainless steel with which the location of a lower part and pro oxidant input port 53 is immediately after an ultrasonic vibrator 3 for the location of the upper part and a tap hole 52, and the volume after pro oxidant input port 53 formed the agitator 4 near 20mL(s) and the pro oxidant input port (refer to drawing 1 ).

[0027] Using this processor, by changing an inflow rate for the sludge of MLSS16000 mg/L and BOD2100 mg/L, the residence time after pro oxidant input port 53 was introduced so that it might be made to change with 1 minute, 3 minutes, 5 minutes, and 10 minutes. It ultrasonicated to coincidence by throwing in hydrogen peroxide solution by part for 1mL/per 10 mL/minute sludge flow rate 1%. Operation for one week per residence-time 1 conditions was performed, the BOD value of 1 time of raw water and treated water was measured every day in the meantime, and each average was calculated.

[0028] An inflow and outflow of sludge are made into an example and reverse using the same processor 1 as an example 1. (Example 2) Consequently, it is considered for the volume after pro oxidant input port 53 that the location of 30mL(s) and pro oxidant input port 53 is just before an ultrasonic vibrator 3. like the example 1, various residence times are boiled, were changed, sonication for one week was performed, the BOD value of 1 time of raw water and treated water was measured every day in the meantime, and each average was calculated.

[0029] (Example 1 of a comparison) It ultrasonicated as the same as an example 1 using the same equipment as an example 1 except having not added hydrogen peroxide solution.

[0030] (Example 2 of a comparison) It ultrasonicated as the same as an example 2 using the same equipment as an example 2 except having not added hydrogen peroxide solution.

[0031] The result of examples 1 and 2 and the examples 1 and 2 of a comparison is shown in drawing 2 . It turns out that BOD of the waste water after also processing a case all goes up in the case of the example 1 and example 2 using hydrogen peroxide solution, and biological treatment nature is improving in it compared with the example 1 of a comparison and the example 2 of a comparison which did not use hydrogen peroxide solution.

[0032]

[Effect of the Invention] Since it is as above, easy biodegradability-ization of organic waste water, living thing nature sludge, etc. is efficiently performed by the synergistic effect of the physical effectiveness by the supersonic wave, and the chemical effectiveness by the pro oxidant, and the art of the waste water of this invention will become effective as reduction-izing of excess sludge, or the pretreatment approach of organic waste water.

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[Translation done.]

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**CLAIMS**

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[Claim(s)]

[Claim 1] The art of the organic waste water characterized by in process or ultrasonicing immediately after a process just before the process which is the waste-water-treatment approach which comes to mix the pro oxidant which makes organic waste water promote oxidation of the organic nature matter in this waste water, and mixes said organic waste water and pro oxidant.

[Claim 2] The art of the organic waste water with which a pro oxidant according to claim 1 is characterized by being hydrogen peroxide solution.

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[Translation done.]